

MAGIC: Summary of workshop on climate

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1. Introductions by CA, Hutton, JRC, UAB

- (A) **H2020 call WATER-2b-2015 and Grant Agreement:** *what are the call's expectations in relation to climate?* We should aim to adapt the model and assumptions we use in Magic with awareness of what is expected from us by the original call.
- i. “tools and methodologies for integrating agriculture, forestry, climate change impacts and adaptation with climate-energy-economic models and land-use models, using a multi-disciplinary approach” (my underline);
 - Challenges in coupling different modelling, such as climatic, hydrological and agricultural. How to make this integration in MAGIC?
 - What are the boundaries to considering climate change in the nexus?
 - **Action point:** Propose at next Consortium meeting to develop a nesting approach for assumptions to fit across spatial and temporal scales, to help ensure consistency as we are all working with sufficiently similar assumptions to allow cross-scale comparisons.
 - ii. contribute to the IPCC. Publications involve AR6 (potentially in 2020) and technical papers on oceans / cryosphere, land-use / terrestrial ecosystems.
 - **Action point:** make a calendar of IPCC publications so specific MAGIC outputs can be timed appropriately.
 - First lead author meetings for the special reports on climate change and oceans and the cryosphere scheduled October 2 - 6th, and on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems October 9 – 13th. AR6 scoping meeting in Addis Ababa, May 1 – 5th. Plenary for discussing the outlines will take place March 28-31st.
- (B) **European Commission narratives:** *how was climate perceived by interviewees in the Commission?*
- i. Main issues: winter package (clean energy for all EU citizens), shift from 2030 to 2050 planning, comparison between European and global policies.
 - ii. Varied perception on climate change. **Energy** perceived as a *driver*, and energy policies as a reaction to climate change. Big focus on energy storage and wind turbines. **Water** sees climate implicitly as a *stressor* (exacerbating issue) to water issues, making things worse. There was concern about the impact on maintaining good ecological status. **Agriculture** and its production as a *driver* for climate change, with awareness of the stress to impacted areas. **Maritime** emissions become increasingly and relatively important as Europe reduces emissions. Is



circular economy actually beneficial to climate change? ([Economic package](#) has both circular economy and climate change as starting points)

- **Action point:** create climate-related codes for the narratives' analyses. Once the assessment is ready, we should try to come up with climate questions for the second round of interviews with EC, should it be possible to arrange additional or follow-up interviews.
 - **Action point:** support the definition of codes for the analysis of interview transcripts in relation to climate change.
- iii. Planetary boundaries are often cited, becoming ever more relevant in the analysis of EU patterns as the timeframe moves from 2030 to 2050.
 - iv. Institutional structure and policies: why policies turn to have specific characteristics? Institutional closeness (e.g. DG-Clima and DG-Energy) might be a reason.
 - v. Hot Topics: Nature Based Solutions (Environment people) / Maritime emissions / wind turbines.

(C) MuSIASEM: how can climate be integrated onto the model?

- i. **Climate impacts** are inscribed in the horizon 2020's call, since they tend to affect future energy, land-use, water and agriculture. MuSIASEM is not dynamic, but rather an accounting mechanism to provide a static shot of reality. It could however be coupled with other models to answer future-looking questions such as "how would energy production and energy security be impacted if emission reduction targets are implemented?". This also links to the assessment of **climate mitigation** targets, such as how reducing 20% of emissions would impact water availability if we reduce 15% from energy and 5% from agriculture; or 10% from energy, 5% from agriculture and 5% from water use? MuSIASEM can provide this accounting clarity.
- ii. **MuSIASEM** should not be considered as the starting or ending point of our assessments. We should bring in experts and stakeholders to analyse, and identify trade-offs and synergies when interpreting results.
- iii. Maybe when running different processors we could use **GHG as an internal input** (fund) and not as an external output. This would be similar to using a *carbon budget*, limiting how much we can use in the entire level (global, regional, national, local) in order to remain sustainable and achieve certain emission reduction targets.
- iv. If using **GHG as an external output**, we should probably consider the idea of splitting them at least into the three main greenhouse gases (i.e. important when looking at the case studies, such as the Scottish livestock sector), and not only CO₂. The different greenhouse gases relevant for the nexus can be converted into CO₂ equivalents for aggregation, using IPCC standardized conversion factors, to be found here, for example ([here](#)).
 - a. **Planetary boundaries** probably have a better focus if scaled down from global to European and national levels. It enables us to answer a different set of questions – not only whether European standards are fair/unfair when compared to the global, but how much Europe should aim at changing in order to impact the world with more than its share of our planetary boundaries.
- v. **Modelling** and results for forecasts in other areas (e.g. agriculture, climate impacts) could be used to have an overview of two points in (future) time: 2030

and 2050, since these are the target-dates for EU Directives we'll be analysing. Maybe also include data for 2070 for a short/medium/long term approach (20-years gap between each scenario).

2. Quantitative Story-Telling

(A) Narratives

- i. We should build on and adjust narratives, not try to reinvent them. Also relevant to be grounded in sound science to start with, to avoid implausible or unlikely speculations – e.g. “what if the world uses European standards?”. In order to avoid this, we should both involve the consortium in building the narratives and also try to achieve some kind of coherence and similar assumptions across all the studies.
- ii. To help develop the narratives, there is a need for agreed assumptions across the consortium (as above) to ensure consistency across spatial and temporal scales.
- iii. Directives assume that many scenarios are moveable over time and the status quo is not assumed to remain the same. Our narratives should try to incorporate this.

(B) Shared socioeconomic pathways (SSPs) as assumptions

- i. Database with 5 pathways designed by a group of institutions and stored at IIASA. They bring together pathways on GDP, population, urbanisation, land-use, energy, air pollution.
 - a. The SSPs have sufficient detail to enable global scale narratives and grammar to be developed (but need to evaluate assumptions used).
 - b. The database contains sufficient data to enable initial population of MUSIASSEM simulations.
 - c. There is scope for using IPCC methods to help fill data gaps.
- ii. Each SSP maps onto a representative concentration pathway hence we can align climate impacts derived from each RCPs (from literature and modelling) to the SSP.
- iii. If we want MAGIC to be relevant for IPCC reports, it's important that we start from similar assumptions, so they can be relatable to what is being produced. SSPs could be a starting point for maintaining coherence across all the partners' assessments.
- iv. SSPs are particularly relevant for upper levels (i.e. global and planetary boundaries, putting the SDGs into context). We could try to maintain some kind of coherence across vertical levels, bearing in mind that pathways tend to become less relevant as they narrow down to local and specific cases.
- v. Usually MuSIASEM tries to go both ways, but since carbon concentrations and forcings are more relevant on the global level, then we should focus on planetary boundaries and mostly on the top-down analysis, nonetheless trying to keep consistency vertically.
- vi. We could build on one SSP or all the 5. Through discussion agreed to aim for all 5 so as to be able to contribute better to IPCC. For time points, we might have yearly time-points or only the three short/medium/long term ones (2030, 2050, 2070) plus a current baseline (determined by data availability, but aim for 2015?).



- **Action point:** contact NAPOLI to understand better their data requirements. Check about possibilities of integrating MuSIASEM with other models, and clarify what is being considered for the visualisation of outputs. Also inquire about time points: can we integrate MuSIASEM into other models and run yearly visualisations, or should we focus only on the three periods (2030, 2050, 2070)?
- **Action point:** check Niklas' involvement with the project. Clarify if he can run the model for one or five SSPs. Mike will check with Keith if Hutton can support Niklas in running the model.
- **Action point:** propose and develop a consortium-wide online database to collect and if possible streamline any assumptions made for the QST. If possible, include and harmonize data sources used for QST at partner institutes. We need to make sure our accounting is compatible across directives and innovations to cover cross-cutting issues consistently and make the most out of the NEXUS as well as MuSIASEM. -> Jan will propose in Wageningen.

(C) Sustainable Development Goals (SDGs)

- i. SDGs can provide an interesting rationality for the **desirability** of policies on the global level, since representing generally agreed goals among countries. This can limit discussions on the philosophical side, framing desirability around specific goals. Generally, open discussion in that regard is preferable. SDGs are not necessarily harmonized, and conflicts between different goals are currently generating scholarly interest, offering a timely opportunity to link up with a relevant debate on planetary boundaries. While this linking opportunity and the political relevance of the SDGs are probably valuable, there are risks involved as well. Limiting the desirability to political and also conflicting targets alone may turn out to be insufficient for analytical purposes, and the consortium will most likely work with different frameworks and concepts for desirability. The concept of desirability will also be developed outside the responsibility of the climate team, and additional workload to compare that with the SDGs can be substantial.
- ii. MAGIC and MuSIASEM's take on the Nexus could be used to identify trade-offs among different goals as well as their distributional effects on EU citizens (winners and losers) if the EU pursues policies in line with the SDGs. SDGs are inherently based on complexity and on the understanding that in order to achieve a certain goal, all others must be taken into account otherwise there might occur leakages and delays.
 - **Action point:** Jan will look at SDGs related to the Nexus, namely 6. clean water and sanitation, 7. affordable and clean energy, 11. sustainable cities and communities (waste, air pollution), 13. climate action, 14. life below water and 15. life on land.
 - **Action point:** launch a discussion on the desirability criterion.
- iii. On the European level, desirability could be framed around European directives' goals – (even if later questioned on the grounds of feasibility and viability). In any case, we could have two layers of desirability analysis: (a) a more philosophical one, inquiring on what is desirable to society at large, and (b) a more specific metrics, based on politically-agreed goals.

(D) Climate and agriculture

- i. CA developing a biophysical crop model, to define changes in planting decisions under a changing climate. Interrelationship between climate-food-water, and

ISIMIP/Phase1 can provide historical simulations and data between crops/agriculture and climate.

- a. There is potential to also link to [AgMIP](#) global scale modelling (Global Gridded Crop Model Intercomparison - [GGCMI](#)) plus their work on Representative Agricultural Pathways (aligning to the SSPs and RCPs) and [MACSUR](#) European scale efforts.
- ii. Relevant questions for MAGIC
 - a. *Climate shocks & imports*: how resilient is Europe to climate shocks in other parts of the world? This would rely on assessing the European dependency on imports and its capacity to react to changes elsewhere (e.g. China and US). Also, issue of water transfer through food trade.
 - Suggestion of articles: [\(1\)](#), [\(2\)](#), [\(3\)](#), [\(4\)](#), [\(5\)](#), [\(6\)](#), [\(7\)](#)
 - b. *Labour*: how relative change in labour/machinery can affect different models' output? This is a crucial question for MAGIC, since many of the stories are built around population and labour availability (urbanisation), or capital-intensiveness and availability.
 - **Action point**: send out to UAB, UTwente and Hutton info about [MacSUR Conference](#) (22/5/17 – 24/5/17, Berlin) – Conference about agricultural-climate modelling

(E) NDCs

- i. Can be attributed on the global level, as all signatories to the Paris Agreement are required to submit NDCs and nearly all countries have done so before 2016. The documents contain emissions scenarios and are usually based on IPCC standards.
- ii. EU: very imprecise and designed for the whole region, with not much certainty on how to translate it into country action at this point (for example Thomas stated that policy analysis becomes problematic when energy production is tied to discourse, such as countries 'doing their own thing'). If we could cover estimates for land-use and oceans, that would be relevant for IPCC. EU member states publish their separate national GHG inventory reports for the UNFCCC, which can serve as an easily accessible and coherent data source for QST and MuSIASEM accounting.
- iii. Potential question: "if current NDCs lead to 2.7°C warming, then what more the world should do to go down to 2°C or 1.5°C? What is the European share in this action? What are the consequences for EU citizens? If Europe cannot/does not do its part, what others would have to do in order to compensate for Europe's inability to act?"
 - Build on outputs from CAT's study "2.7°C is not enough – we can get lower" ([here](#))

3. Work Plan

(A) Develop global grammar for top-down coherence

- i. In order to **set the agenda for the global level**, we must develop a global scale grammar together. We can use it to train in the methodology and identify what we might be lacking, so we can clarify in Wageningen.
- ii. Start from SSPs, for cohesion. Split greenhouse gases among the three main ones related to the nexus whenever possible: CO₂, CH₄ (methane) and N₂O (nitrous oxide), hence with use neither of CO₂eq nor CFCs.



- iii. Present the grammar as an initial progress in Wageningen. Include feedback on how to include other sectors, necessary data etc.
 - **Action point:** create a grammar for the global level together. CA, with support of Hutton and UAB. Schedule Skype calls for discussing more effectively before the Wageningen meeting. Present in Wageningen as a kick-start to the deliverable and ask for inputs from consortium.

(B) Pilot-case: global level and planetary boundaries

- i. Develop on the global grammar, integrating other existing UAB grammars and data/variables (e.g. IPCC). In case there are doubts regarding the coherence with upper and lower levels, use IPCC for clarifications and dummy variables.
- ii. **Action point:** Draft document of proposed work plan and aims for integrating climate change into MAGIC for presentation in Wageningen May meeting (CA, JHI).
- iii. Define critical pathways that will need to happen.
 - **Action point:** build a pilot-case between CA & UAB (& Hutton?) in Barcelona for the global level, defining a top-down approach for planetary boundaries. Luis will work on it with Zora from mid-May. Jan and Mike might join.

(C) Presentation to Climate Analytics

- i. Organise an internal presentation to Climate Analytics. Explain MAGIC, covering how MuSIASEM works, expected outcomes and current directions. Ask for feedback on how to build on specific sectors.
- ii. Invite panellists from other MAGIC partners to join the presentation?

(D) Innovation/directives case studies

- i. Contact each partner individually: make sure there is involvement in the process of analysing different directives & innovations, so any climate-related questions can be solved quickly and we can aim at a more climate consistent analysis of all sectors.
 - a. Develop approach whereby each partner can identify data they will be using that has a GHG emissions or sequestration component (energy, material used, climate regulation ecosystem service etc.).
- ii. Innovations: focus on biofuel (and fracking), given their connection with climate change discussions to check the consistency of our approach with the analysis conducted there.
- iii. Understanding by Hutton of how to connect the Habitat Directive (lead: Wageningen) with the cross-cutting analysis of sustainability and climate change.

(E) Consistency check

- i. After all studies are drafted: check if they're mutually consistent in relation to climate change. Are there any conflicts? This should be an easier work once we have a pilot grammar.
- ii. Ensure there's no double-counting from different funds/flows, both manmade and ecosystem originated ones.